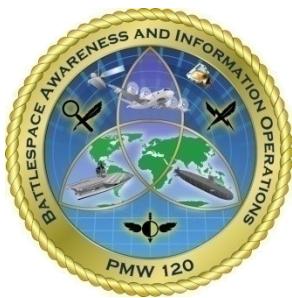
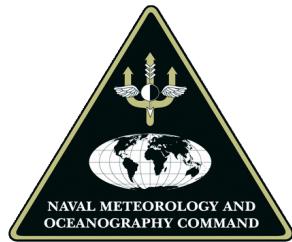


6.4 N2/N6E Project Review

08 November 2012



Project: Preparing Tactical Ocean Optical Products for Future Polar-Orbiting Sensors

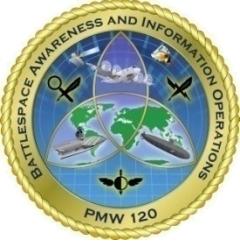
PI: Sherwin Ladner

Email: sherwin.ladner@nrlssc.navy.mil

Phone: (228)688-5754

Robert Arnone (USM), Paul Martinolich (QNA),
Adam Lawson (NRL), Jennifer Bowers (QNA)

Customer: Paul Lyon (NAVO), Ken Grembowicz
(NAVO)



Preparing Tactical Ocean Optical Products

for Future Polar-Orbiting Sensors



Objectives

Prepare NAVOCEANO's satellite product operations to derive tactical optical products from ocean color sensors for integration into operational products.

Integrate ocean color satellites into operations.

- Identify new sensors and capabilities
- Establish Data Stream
- Extend algorithms & software to new sensors
- Ensure calibration / validation of sensor products
- Calibrate new sensors with existing ones

FY12 Accomplishments/Challenges/Issues
Enhance operational algorithms for ocean color products)

Accomplishments

- VIIRS processing/integration (AOPS v4.8) operational with cal/val 9 months after launch.
- VIIRS data stream established at NAVO (Air Force IDPS/AFWA)
- VIIRS data stream from NAVO established at NRL (Regional/Packaged)
- VIIRS data stream established at NRL from CLASS & GRAVITE
- GOCI data stream established at NAVO and flowing to NRL (October 2012)
- MODIS calibration upgrade (v6.0)
- IOP upgrade (QAA) for MODIS and VIIRS

Issues:

Delays in GOCI automation in AOPS just recently

Deliverables Transitions FY12-FY13

Delivered:

- Beta version of AOPS v4.8 w/ VIIRS Capability (September 12)
- AOPS v4.8 OpEval complete
- AOPS version v4.8 complete with VTR (November 2012)
- Initial GOCI processing capability (December 2012)

Not Automated

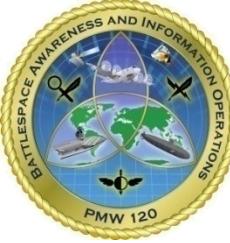
Planned:

- OpTest AOPS v4.8 starting at NAVO (November 2012)
- Cal/Val Updates Quarterly for VIIRS
- AOPS v5.0 with GOCI Automation with VTR, Cal/Val and new BRDF correction.

Funding

- AOPS v5.0 OpEval completion (June 2013)
- AOPS v5.0 Transition/OpTest completion

(\$K) (August 2013)	FY10	FY11	FY12	FY13	FY14
Develop RT NPP/GOCI Ocean Products	100	100	60	50	75
Transition AOPS	100	100	125	100	125
Global Optical Cal/Val	200	100	100	175	200
Integrate GOCI-1 into Ops	100	100	100	175	200
Evaluate JPSS1, Sentinel3, GOCI2					
Total	500	400	385	500	600



Preparing Tactical Ocean Optical Products



for Future Polar Orbiting Sensors

Preparing Tactical Ocean Optical Products from Future Polar Orbitors

	FY11				FY12				FY13				FY14				FY15			
	Q1	Q2	Q3	Q4																
Develop real-time ocean products from NPP data stream and other sensors	S						D				S					D				
AOPS Transition and OpTest		S	V					V	O			V	O			V	O			V
Product validation real time validation / calibration "network" for monitoring global satellite products & uncertainty			S				D				D				D					
Integrate GOCI-1 into Operations and Evaluate JPSS1, DWSS, Sentinel 3 GOCI - 2 for operational products			S	V	D			D			D		D		D		D			

Milestones indicate VTR panel-accepted and OPTEST

GOCI Integration/Automation 80% complete, GOCI Integration Q1FY13 - Automation w/ Cal/Val Behind; VTR/OPTEST complete Q3FY13, issues: GOCI data stream delay

VTPRS processing in AOPS v4.8 100% complete; Transition/VTP/OpTest on



Preparing Tactical Ocean Optical Products for Future Polar-Orbiting Sensors



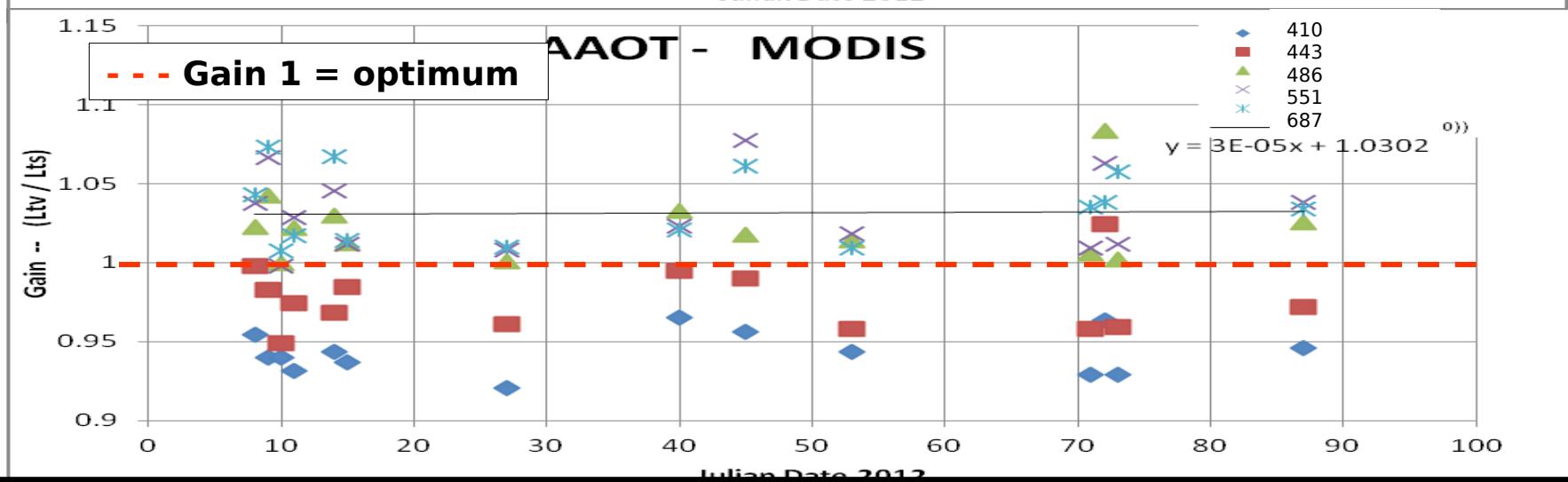
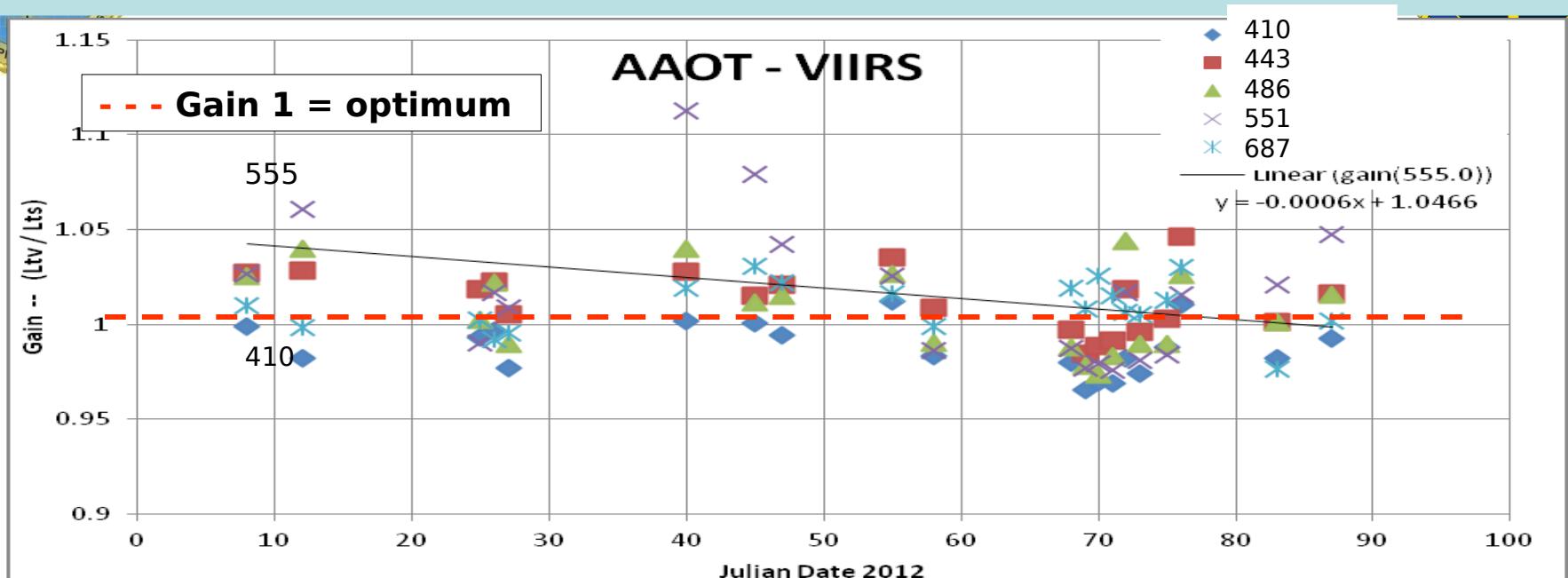
Transition Plan Summary

- **TRANSITION APPROVAL STATUS:** AOPS v4.8 transition plan approved by James Rigney (NAVO) and Paul Lyon (NAVO) in Q1FY13 **
- **CAPABILITY REQUIREMENTS BASIS:** This project supports CNO validated requirements CINC OCEN 91-06 Ocean Prediction Models, LITT OCEN 93-06 High Resolution Surface Current Predictions, USMC 93-01 Littoral Sea Environment and addresses needs outlined in the Concept of Operations for Naval Oceanography Support to Expeditionary Warfare (November 2009)
- **INPUTS:** Inputs include satellite derived top of atmosphere radiance imagery (level 1) from IDPS and outside data streams (via ftp) and GOCI FTP data stream.
- **OUTPUTS / PRODUCTS:** Ocean optical environment including :diver visibility, LIDAR penetration depth, biological activity, short wave absorption flux, Warfare support of MIW, SDV vulnerability, assist in mission planning for bathymetry, evaluation ocean models.
- **ACCEPTANCE CRITERIA:** VTR includes validation from regions around the world. And installation and OpTest of the AOPS on NAVO A2 computer. . ***Validation test panel identified, met in Q4 FY12 ????
• **OPERATIONS AND MAINTENANCE REQUIREMENTS:** One man month per fiscal year estimated for transition liaison, installation, integration, and testing. ****
- **** transition partner:** include operational point of contact and contact info (this should be a person who has reviewed the transition plan and agrees that it is accurate)

***Validation Test Panel members (note if the panel is formally identified, has met, when, or suggested)

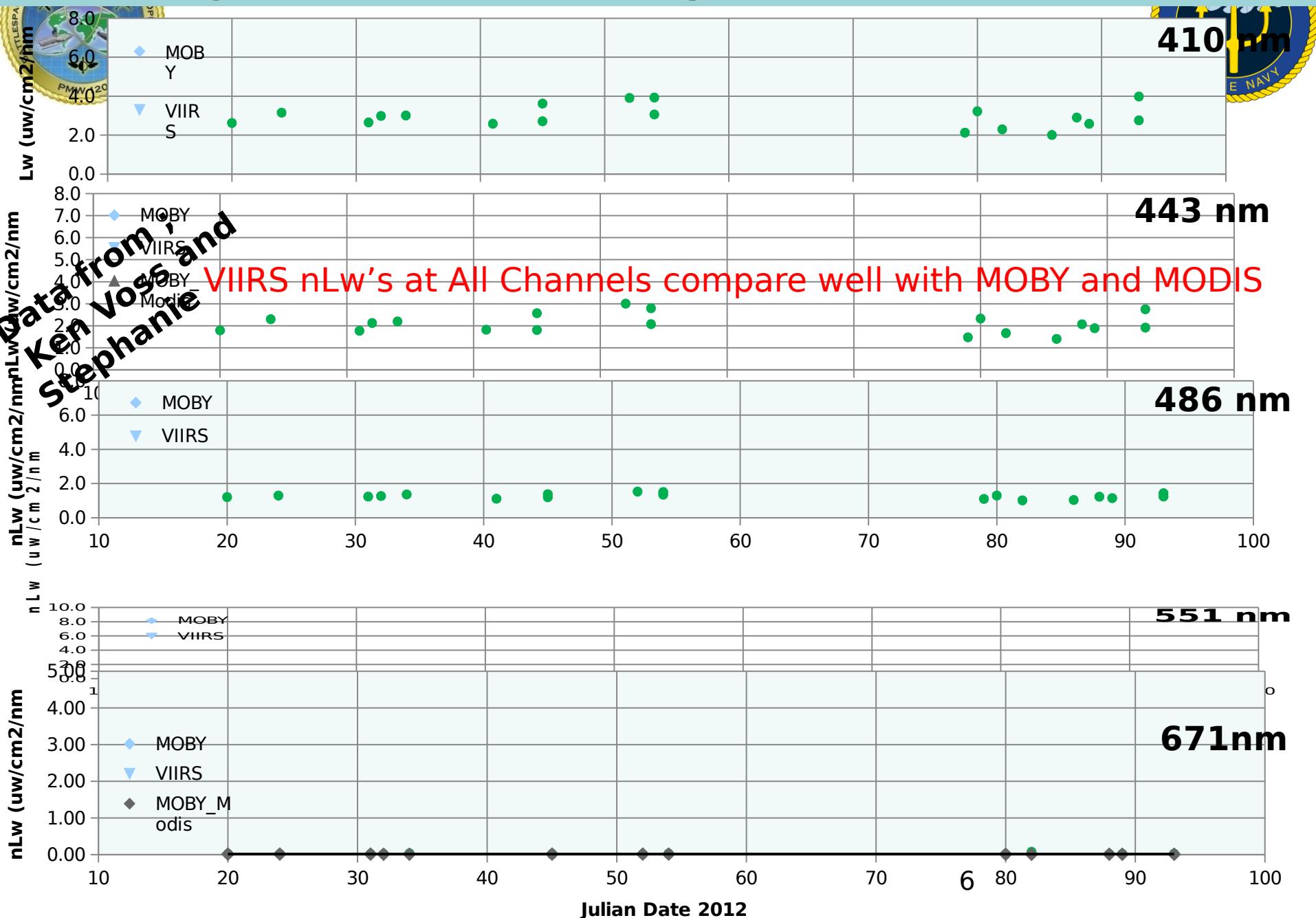
****Ongoing Project FY12 or earlier new starts should have “good” estimates for this transition

Tracking the Vicarious “Gains” at Venice Aeronet Site



S & MODIS compare well , VIIRS trend improving with New L

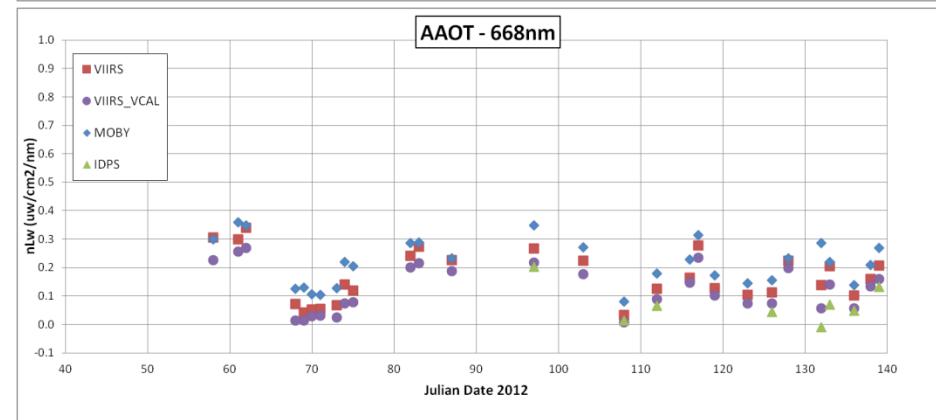
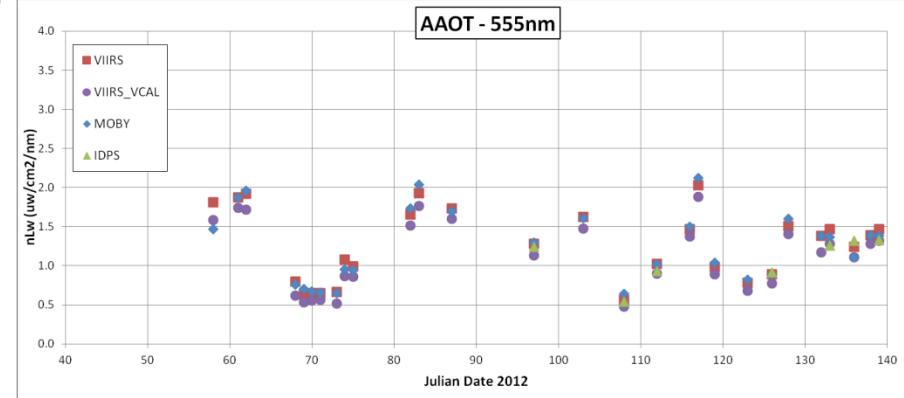
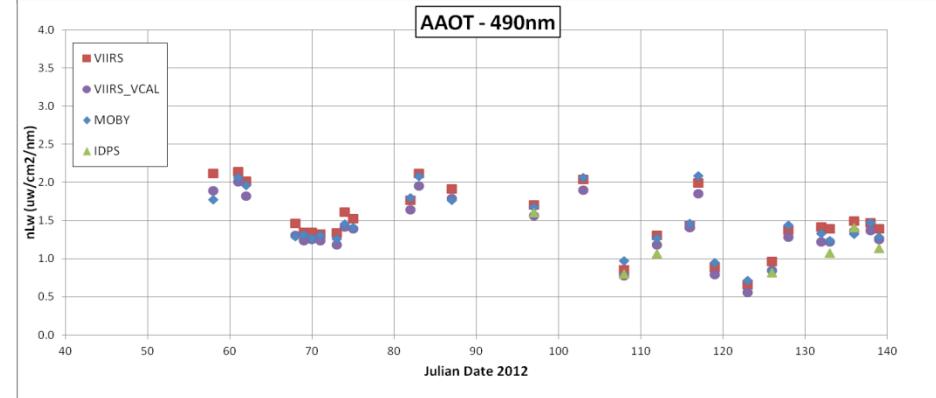
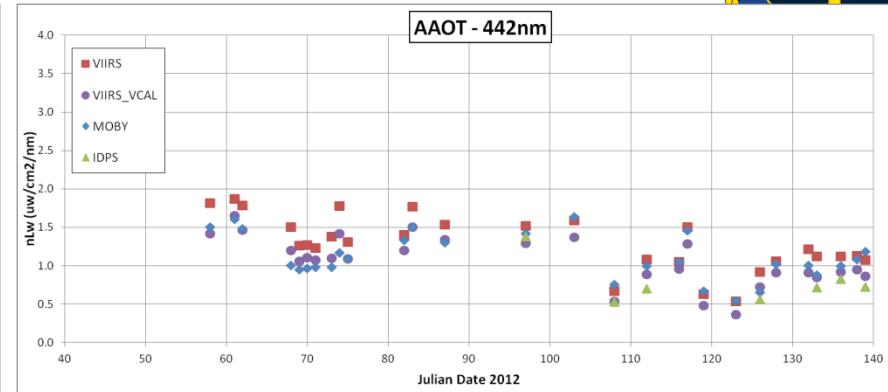
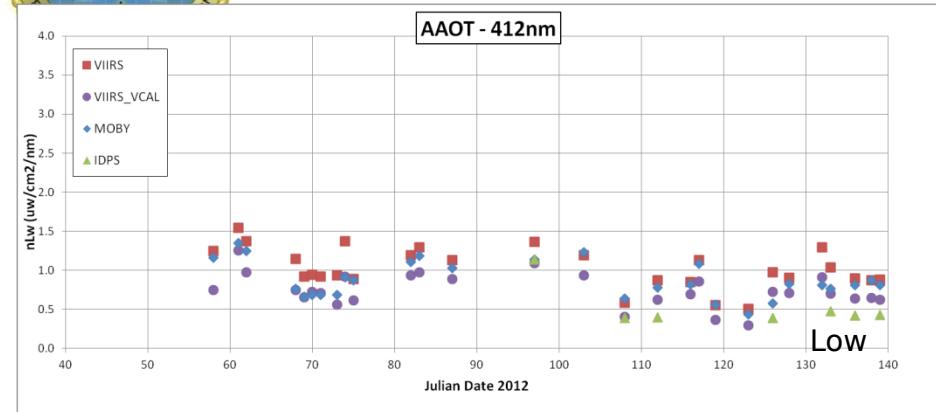
Tracking nLw at MOBY Buoy- VIIRS/MODIS Matchup





AAOT VIIRS vs Aeronet-OC Matchups

April 24 - June 10, 2012



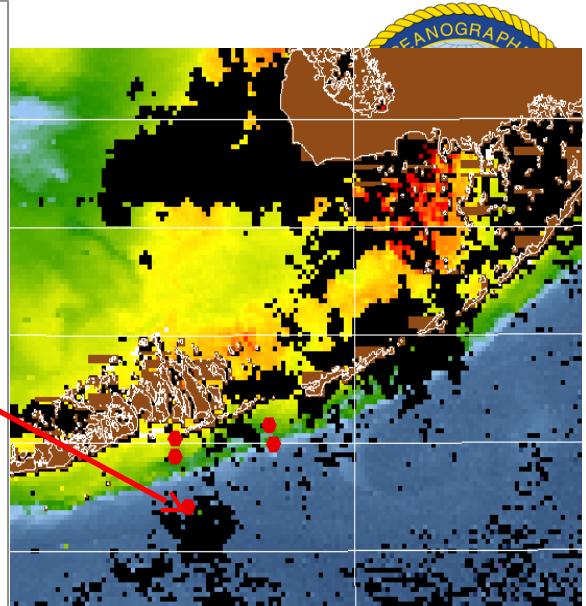
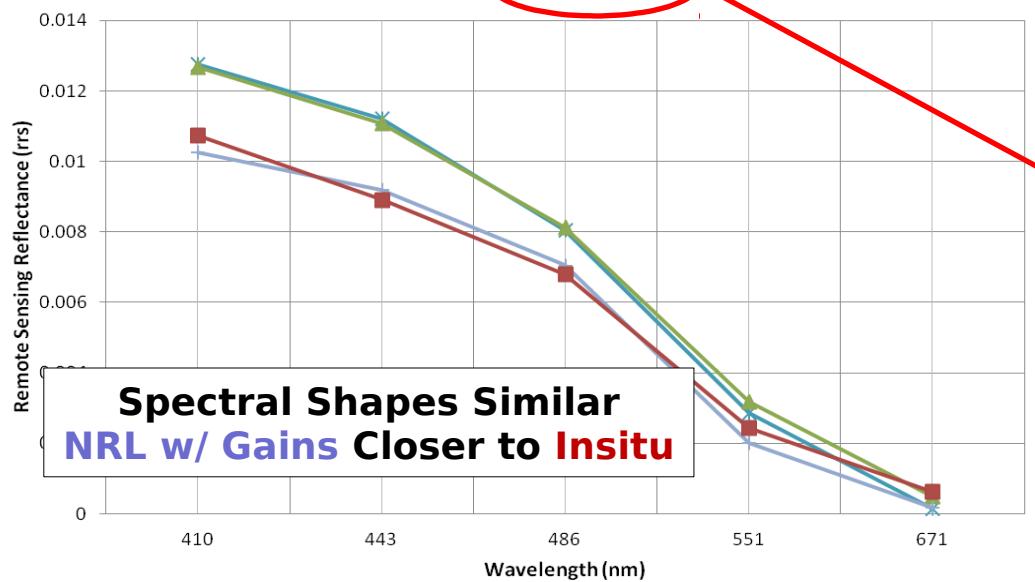
AAOT SeaPrism - Blue
NRL nL2gen "Red" - no gain
nL2gen "Purple" with Moby Gains

IDPS EDR's "Green"

All VIIRS processing techniques
followed similar *in situ* temporal

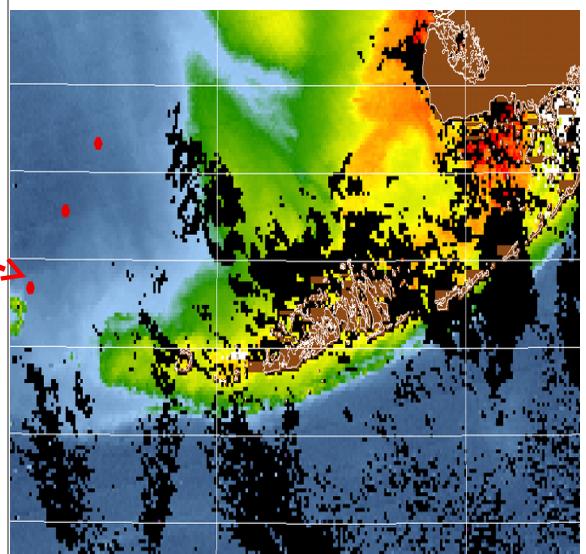
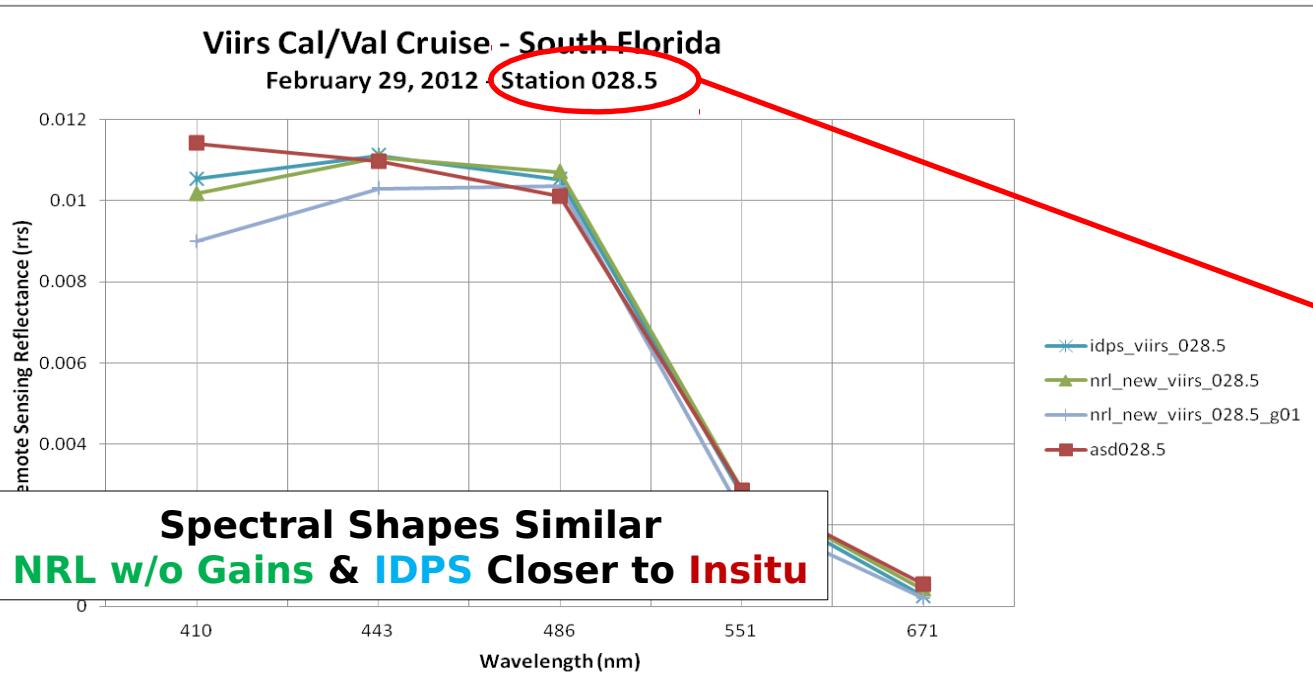
Viirs Cal/Val Cruise - South Florida

February 28, 2012 - Station 021

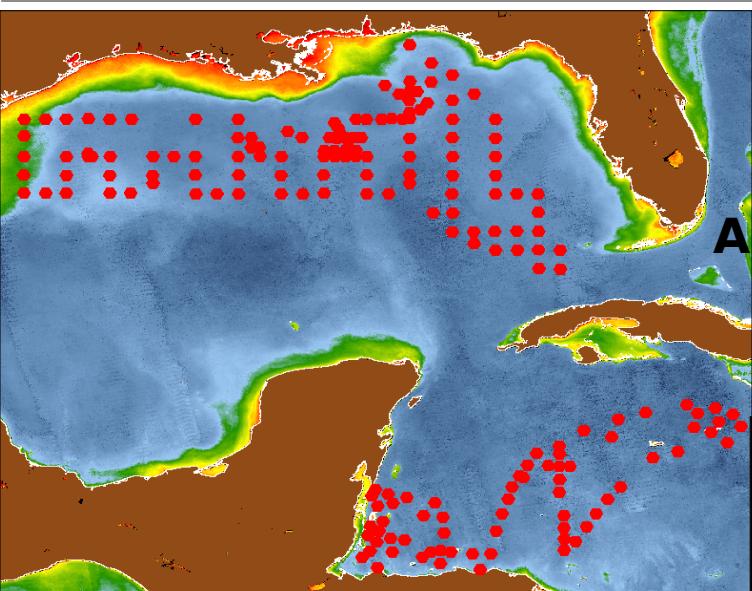
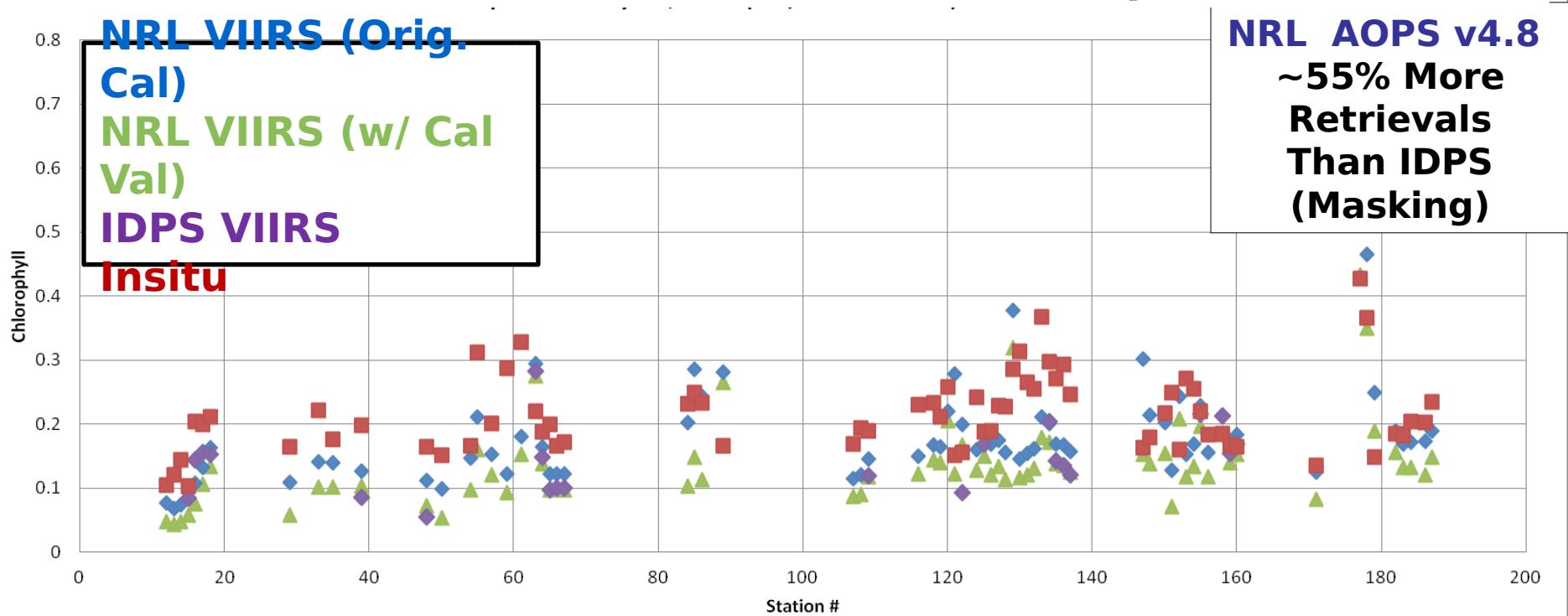


Viirs Cal/Val Cruise - South Florida

February 29, 2012 - Station 028.5



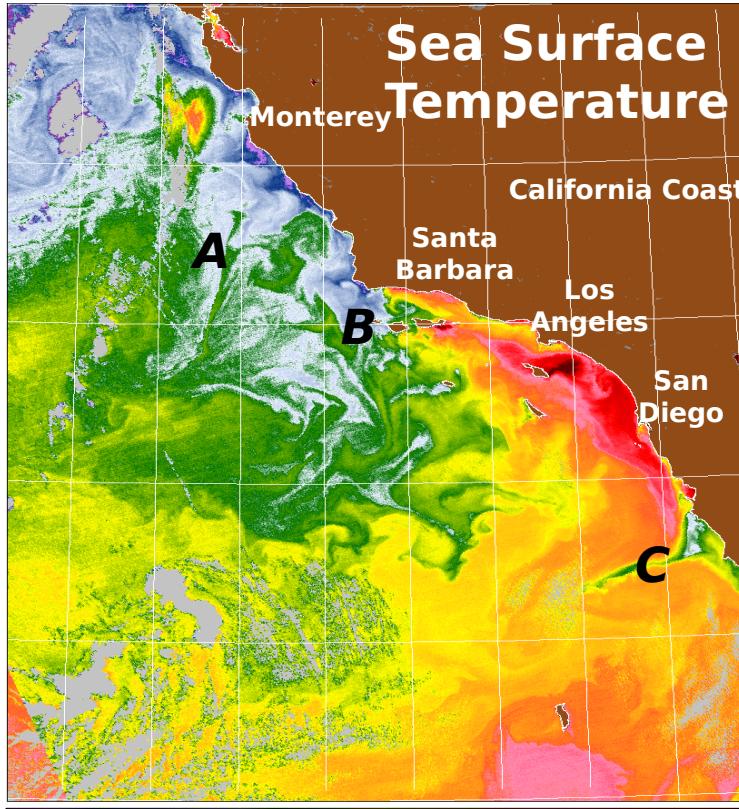
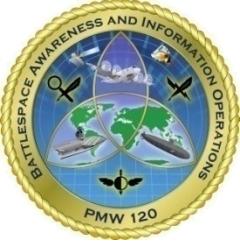
Gulf of Mexico Cruise - April 02 - May 28, 2012



190 Stations
April 2012 Monthly Mean Chlorophyll

Data from Mitch Roffer and John Lamkin (NMFS cruise)
CTD - Fluorometer

VIIRS Chlorophyll matchups with the new calibration/validation applied producing much better results! VIIRS doing very well!



10.5 12.5 14.5 16.3 1 0.01

deg (°C)

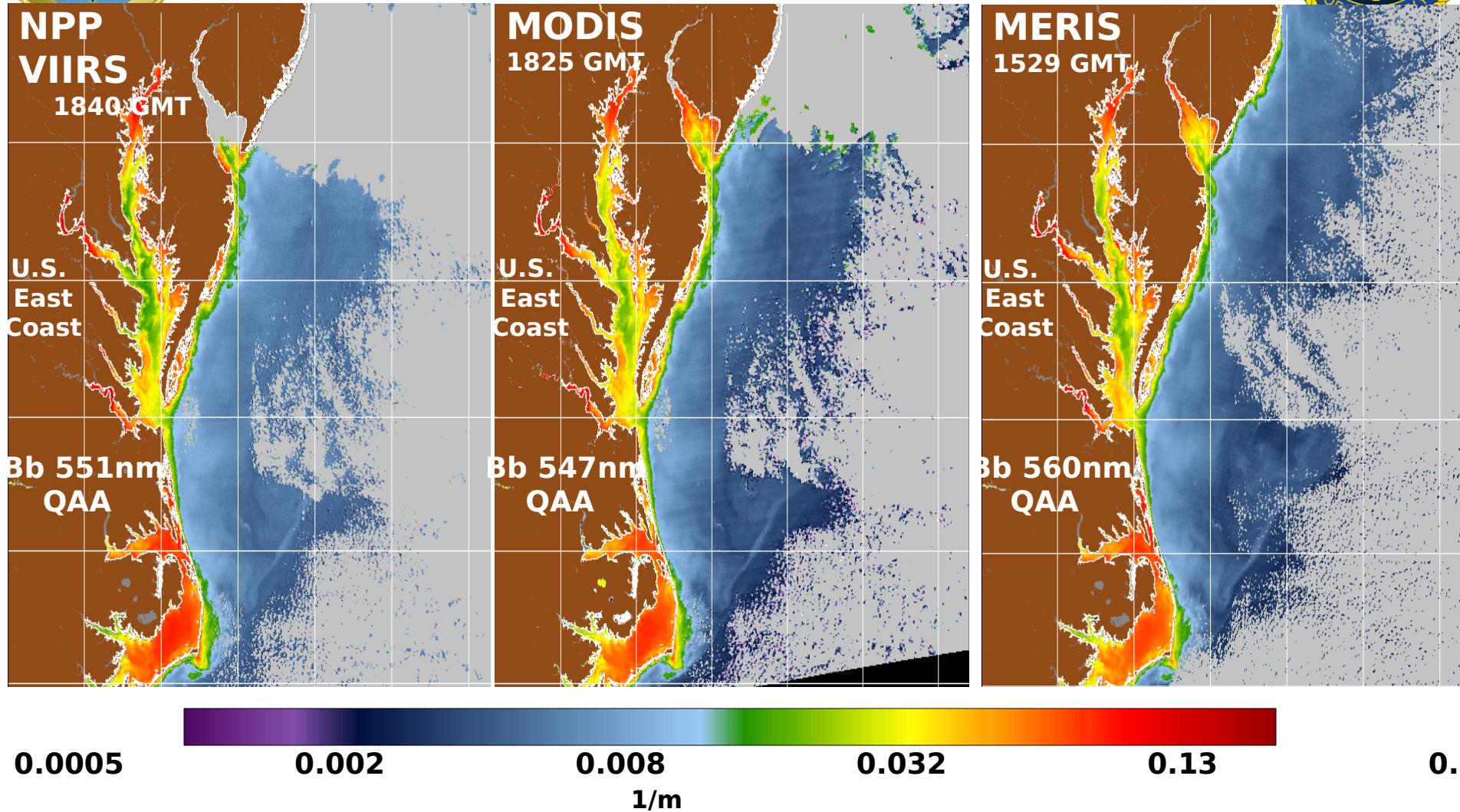
0.054 0.29 1.6 8.4 45

mg/m³

VIIRS Navy Ocean products for the Southern California Bight.
Coastal upwelling filaments at A, B, and C, show satellite retrievals of
complex coastal and offshore interaction of SST and color response



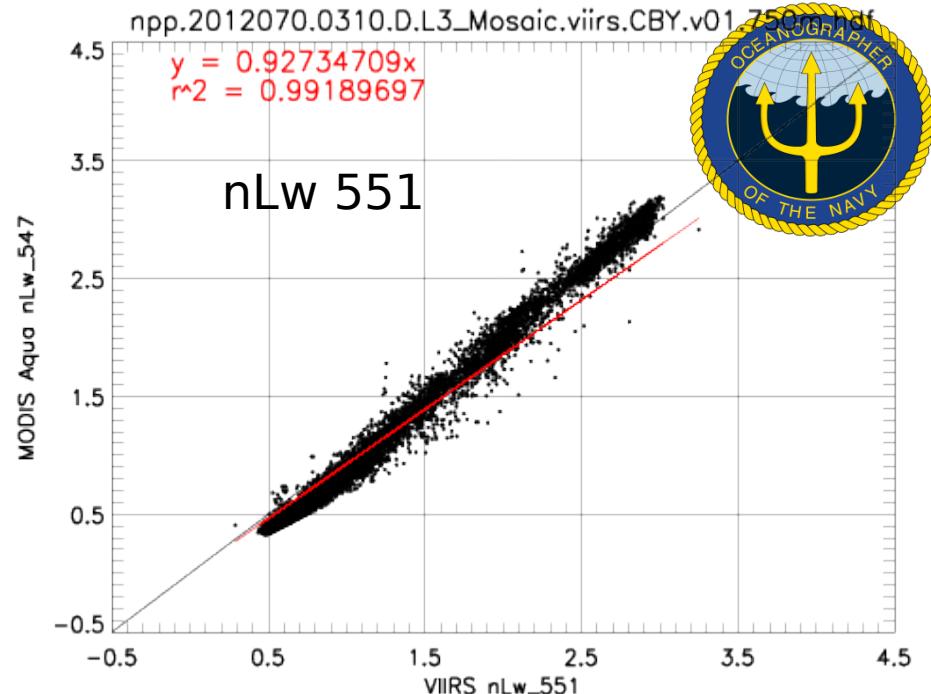
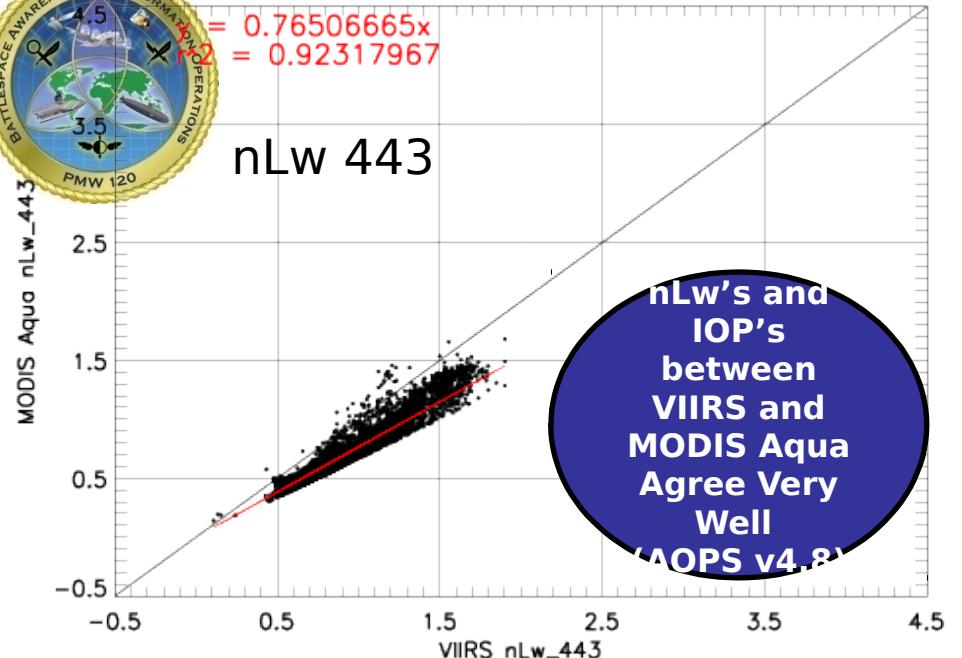
Inter-Sensor Matchups



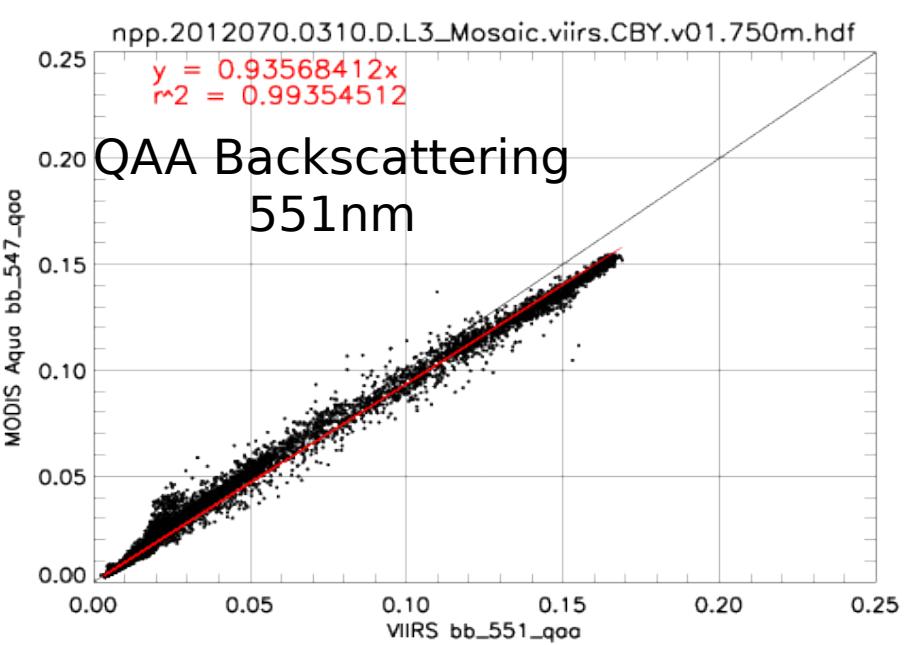
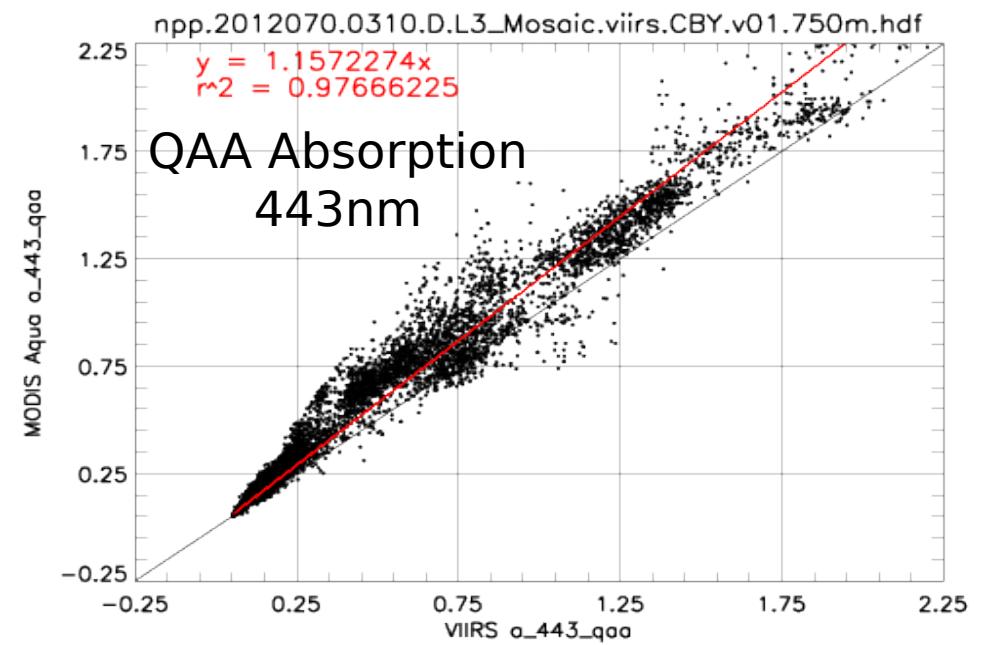
Inter satellite comparison of Navy Ocean Optical backscattering product of the Gulf Stream and Chesapeake Bay for Mar 10, 2012. Note the log color scale. Values are within the time and space uncertainty of the product.



npp.2012070.0310.D.L3_Mosaic.viirs.CBY.v01.750m.hdf



NRL AOPS - VIIRS (y-axis) vs. MODIS Aqua (x-axis) nLw's and IOP's

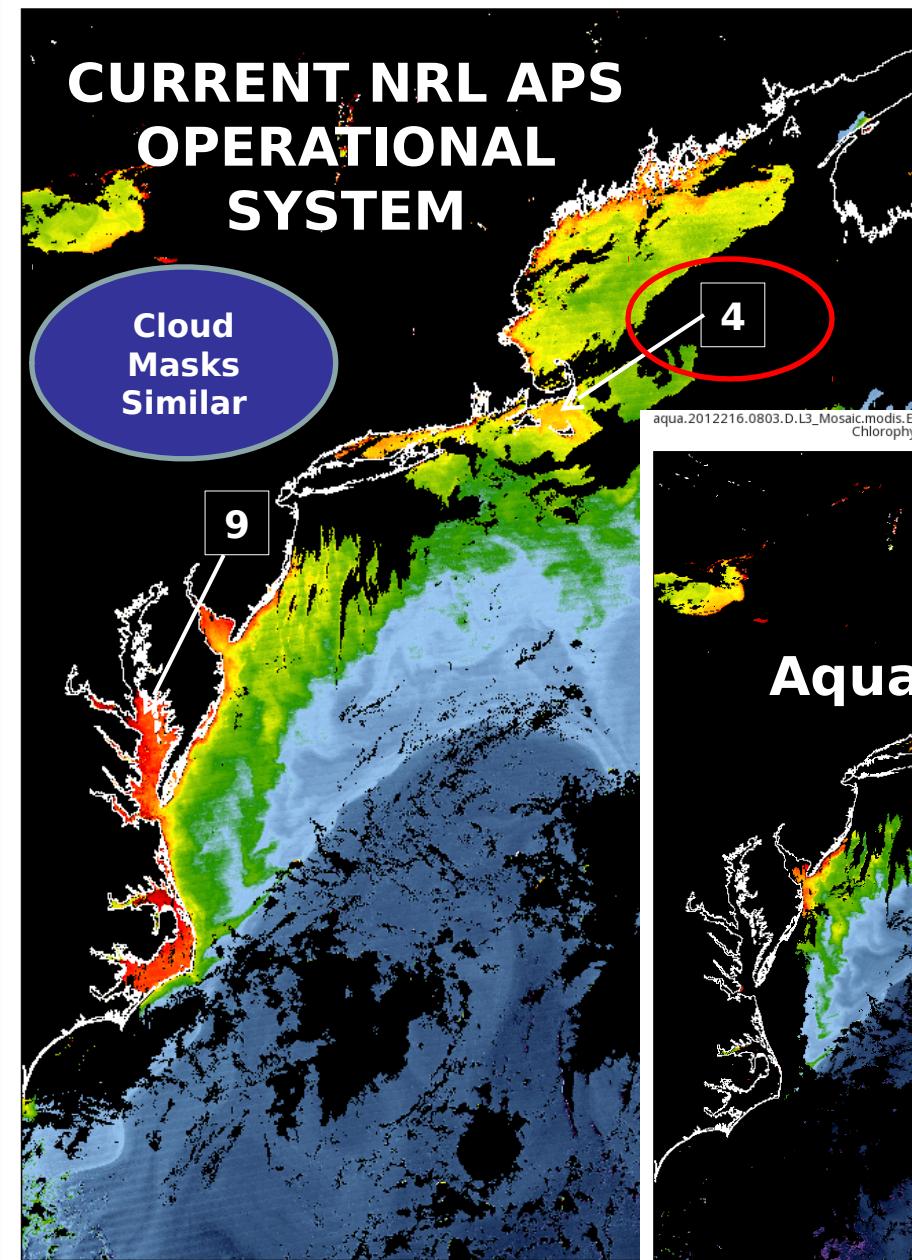


CURRENT NRL APS OPERATIONAL SYSTEM

Cloud
Masks
Similar

9

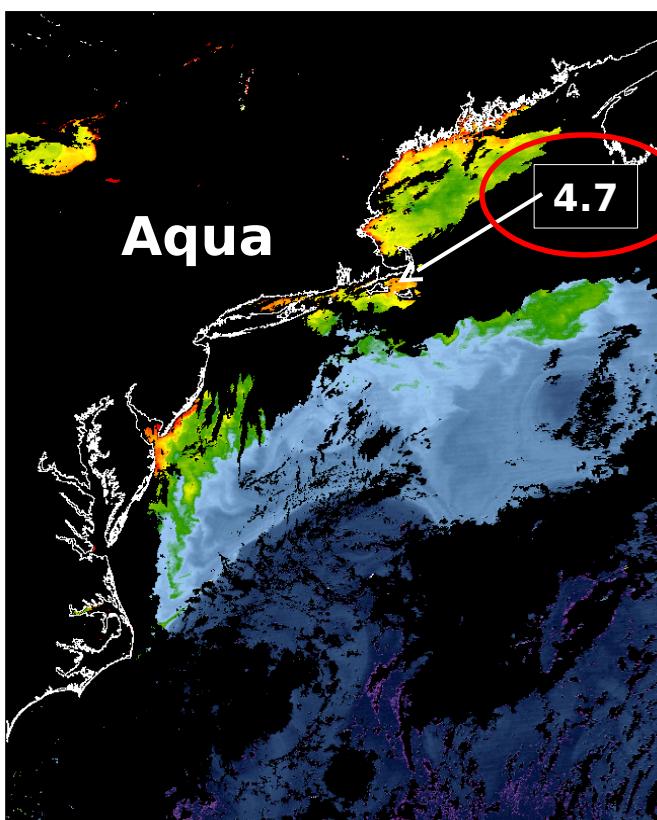
4



FUTURE 6.4 IDPS OPERATIONAL SYSTEM PLANNED FOR JANUARY 2013

Higher

13



Aqua

NRL AOPS
and MODIS
Aqua CHL
values
compare
well - IDPS
estimates
are higher